



## **Performance Comparison of 10G-Class Partial Response Multilevel Modulation Formats in Access Network Scenarios with Limited Electronic Bandwidth**

**Madsen, Peter; Suhr, Lau Frejstrup; Rodríguez Páez, Juan Sebastián; Vegas Olmos, Juan José; Tafur Monroy, Idelfonso**

*Publication date:*  
2016

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Madsen, P., Suhr, L. F., Rodríguez Páez, J. S., Vegas Olmos, J. J., & Tafur Monroy, I. (2016). *Performance Comparison of 10G-Class Partial Response Multilevel Modulation Formats in Access Network Scenarios with Limited Electronic Bandwidth*. Poster session presented at Optoelectronics Global Conference 2016, Shenzhen, China.

---

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



# Performance Comparison of 10G-Class Partial Response Multilevel Modulation Formats in Access Network Scenarios with Limited Electronic Bandwidth

P. Madsen, L. Suhr, S. Rodriguez, J.J. Vegas Olmos and I. Tafur Monroy

DTU Fotonik, Technical University of Denmark (DTU), 2800 Kgs. Lyngby, Denmark

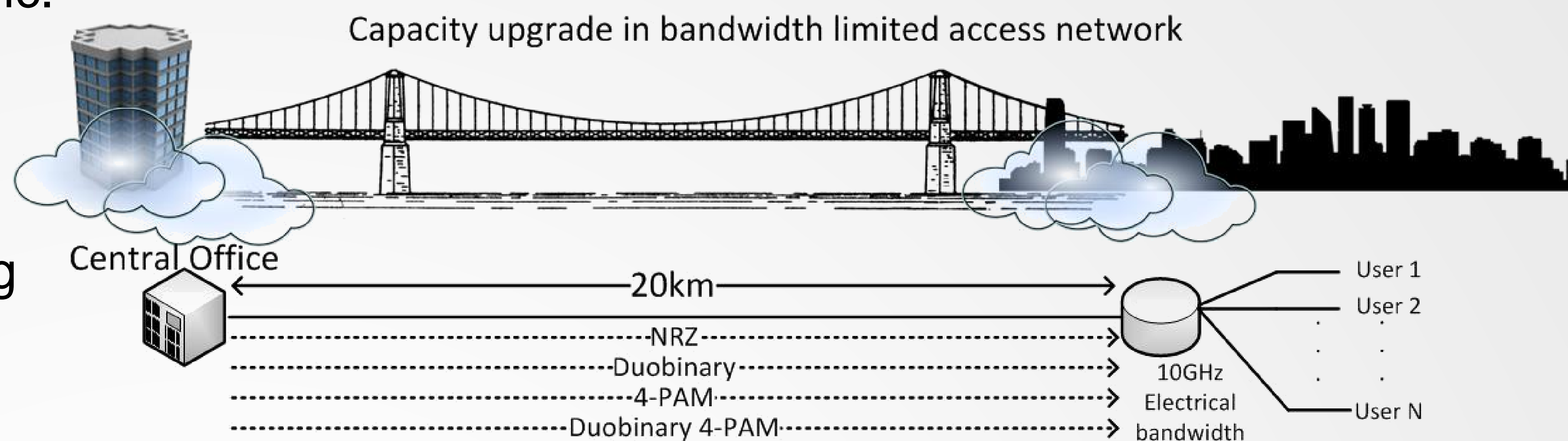
pema@fotonik.dtu.dk



## Introduction

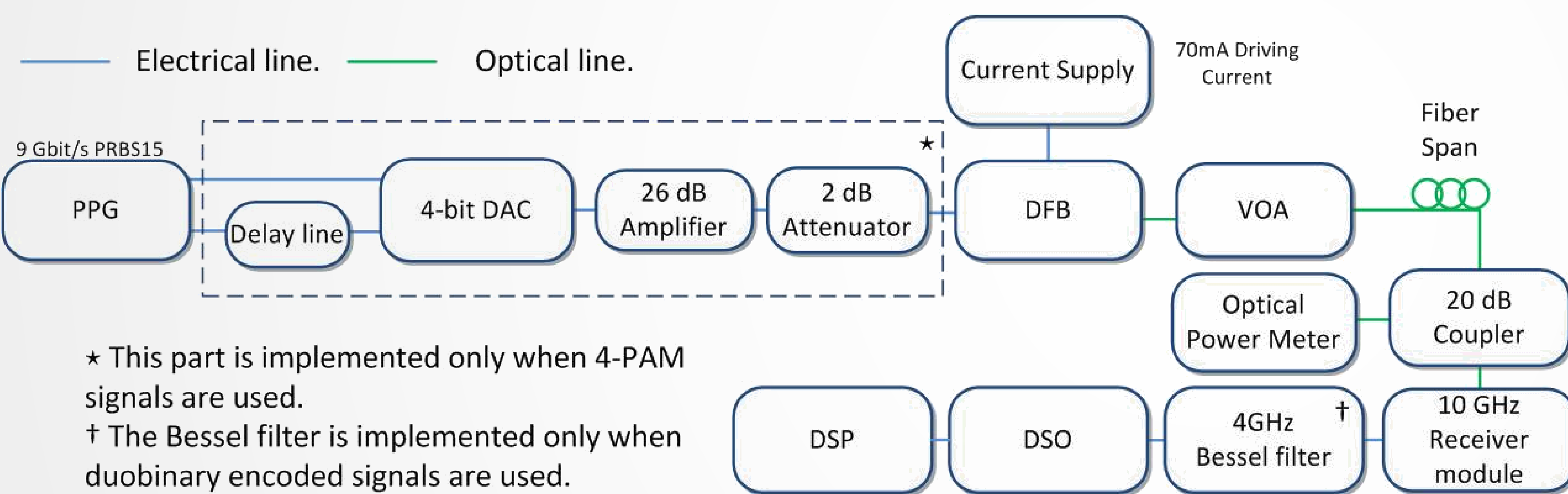
- Reports from Cisco states that metro network only traffic will surpass that of Long haul network traffic.
- Optical metro networks needs an upgrade.
  - Mainly limited by low electrical bandwidth.
- Discrete Multi Tone (**DMT**) and Orthogonal Frequency Division Multiplexing (**OFDM**) is being considered.
  - Requires large amounts of Digital Signal Processing (**DSP**).

## Scenario



- Maximum transmission distance of 20 km.
- Maximum electrical bandwidth 10 GHz.
- Maximum symbol rate <10 Gbaud.

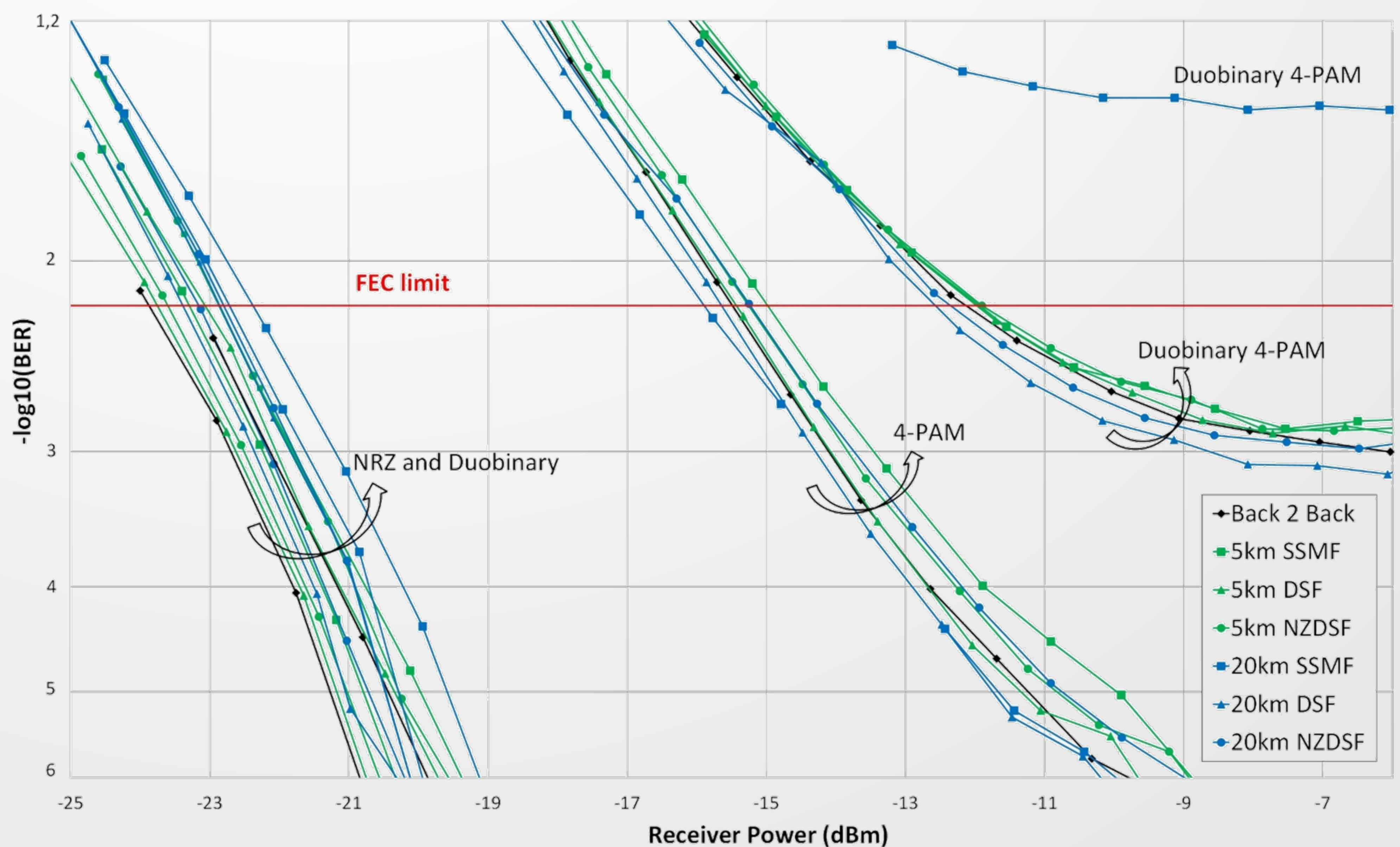
## Experimental Setup



## Conclusion

- **Duobinary** performs on par with NRZ.
  - Duobinary** can be implemented with no significant penalty in received power.
- With access networks designed for 10 Gbps, we are able to transmit 18 Gbps **4-PAM** below the **FEC** limit.
- The **4-PAM** signal can be filtered by a 4 GHz Bessel filter, creating a **Duobinary 4-PAM** signal.
  - Performing below **FEC** for **DSF** and **NZDSF** up to 20 km.
  - Only 3 dB power penalty to the received power.

## Experimental Results



想要了解更多实验结果，及其他激动人心的实验，请参观丹麦技术大学在丹麦馆的展位，一号厅，1A06号展位。